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An uncontrolled, feasibility study of a group intervention to reduce hepatitis C transmission risk behaviors and increase transmission knowledge among women who inject drugs

Abstract

Aims. This study aimed to develop and test the feasibility, acceptability, and initial effectiveness of a 3-session psychosocial group intervention to reduce hepatitis C risk behaviours and increase hepatitis C transmission knowledge among women who inject drugs in five European cities/towns.

Methods. An uncontrolled, field effectiveness study of a psychosocial group intervention. Hepatitis C virus transmission knowledge, sexual and drug risk behaviours and depressive symptoms were assessed at baseline and one-month post-intervention. Intention-to-treat analyses were conducted. **Findings.** One-month post-intervention, a significant increase was reported in hepatitis C virus transmission knowledge and in the number of new and unused needles/syringes used to inject. There were significant reductions in the sharing of spoons/containers for mixing that had been used by someone else, sharing of filters, cookers, spoons or water with someone who was hepatitis C positive and the use of alcohol swabs following injection.

Conclusions. The intervention showed promising results in reducing some hepatitis C injecting risk behaviors and increasing hepatitis C transmission knowledge among women who inject drugs. These preliminary findings suggest that it is feasible to deliver the intervention in drug treatment settings, and that the intervention was acceptable to both participants and staff.

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INTRODUCTION

In Europe the prevalence of Hepatitis C virus (HCV) is estimated at around 2-3% of the general population (Mohd Hanafiah et al., 2013), rising to 5-90% among people who inject drugs (Hahne et al., 2013). Sharing needles/syringes and other injecting equipment/ paraphernalia pose the greatest risk of HCV transmission among people who inject drugs (Corson et al., 2013). Many people who inject drugs have poor knowledge of HCV transmission (Norton et al., 2014; O'Brien et al., 2008), contributing to the high prevalence in this group. While there is no increased risk of HCV transmission in a long term, heterosexual relationship, the risk of transmission increases with multiple sexual partners (although this may be confounded by increased likelihood of injecting drug use with increased number of partners), among women who are infected with HIV and among men who have sex with men who are infected with HIV (Tohme & Holmberg, 2010). Being female is a predictor of HCV seropositivity (Vescio et al., 2008). One longitudinal study of young injectors found that females who injected drugs were more likely than males who injected to become infected with HCV (Tracy et al., 2014), suggesting that females may engage in behaviours that put them at increased risk of infection. Therefore, preventing the transmission of HCV among people who inject drugs, especially females, is a major public health challenge.

Increased risk of HCV among females who inject drugs

A number of studies that have explored injecting risk behaviours in relation to blood borne virus transmission have highlighted the social, interpersonal and functional contexts in which injecting occurs (Bourgois et al., 2004; MacRae & Aalto, 2000; Sheard & Tompkins, 2008; Tompkins et al., 2006). Studies that have examined the injecting behaviours of women found that they report risk behaviours that include sharing needles, syringes and other injecting paraphernalia, having sex with people who inject drugs, trading sex for money or drugs and not using condoms (Booth et al., 1995; Brook et al., 2000; Gilchrist et al., 2011; MacRae & Aalto, 2000). A recent study in England, reported that 15% of women had traded sex for money, drugs or other goods in the year before entering treatment for drug use (Gilchrist et al., 2015). Women who engage in sex trading may not use condoms with their intimate partners to distinguish these private relationships from sex trading (Bernstein, 2007). Women who inject drugs are more likely than their male counterparts to have sexual partners who also inject drugs and with whom they share injecting equipment (Bennett et al., 2000; Evans et al., 2003; Gilchrist et al., 2007; Hahn et al., 2002; Stein et al., 2005; Wood, 2007). Moreover, many women rely on others to inject them, often male sexual partners (Bryant & Treloar, 2007; Doherty et al., 2000; Hahn et al., 2002; MacRae & Aalto, 2000; Wood, 2007), which reduces their control over the injecting process (MacRae & Aalto, 2010; Tompkins et al., 2006). Studies suggest that around 40-70% of women receiving treatment for drug misuse have experienced intimate partner violence (Engstrom et al., 2008; Gilchrist et al., 2011; Panchanadeswaran et al., 2010; Wagner et al., 2009), which may impact on their ability to insist on safer injecting and sexual practices (MacRae & Aalto, 2000; Wagner et al., 2009), potentially resulting in increased vulnerability to HCV infection. HCV risk behaviours

among women who inject drugs, should therefore be understood in the context of their relationships with male partners (Hearn et al., 2005). The social proximity of other injectors has been shown to be influential on perceptions of risk. The closer the proximity of injecting partners/peers, the less perceived risk with sharing injecting equipment (MacRae & Aalto, 2000; Smyth & Roche, 2007). Women who inject drugs are often marginalised and socially isolated, and as a result often engage in smaller social networks increasing the likelihood of sharing injecting equipment (De et al., 2007). A high proportion of female drug users meet criteria for a depressive disorder (Torrens et al., 2011). Apathy and low mood are associated with risk behaviours among drug users (Gilchrist et al., 2011; Stein et al., 2005).

Efficacy of interventions to reduce HCV transmission

Most interventions to reduce injecting and sexual risk behaviours among people who inject drugs have targeted HIV transmission (Meader et al., 2010). Needle and syringe programmes and opiate substitution treatment are effective in reducing injecting risk behaviours (Hagan et al., 2011), and interventions that integrate treatment for substance misuse with support for safe injection demonstrate the most efficacy for reducing HCV seroconversion (MacArthur et al., 2014). In a systematic review of six behavioural interventions to prevent HCV among people who inject drugs, (Sacks-Davis et al., 2012) only two peer training interventions of HCV and HIV negative (Garfein et al., 2007) and HCV positive (Latka et al., 2008) young injectors reported significantly greater reductions in injecting risk behaviours in the intervention group compared with the control group at 6 month follow-up. Those who tested HCV and HIV negative were eligible for the Third Collaborative Injection Drug Users/ Drug Users Intervention Trial (DUIIT) (Garfein et al., 2007) and those who tested HCV

positive were eligible for The Study to Reduce Intravenous Exposures (STRIVE) (Latka et al., 2008). Both trials compared similar 6 session x 2 hour small-group, cognitive behavioural, skills-building interventions that taught peer education skills to reduce injecting (Garfein et al., 2007; Latka et al., 2008) and sexual risk behaviours (Garfein et al., 2007) or a video discussion group. Among those who were HCV and HIV negative, the intervention group reported a 29% greater reduction in injecting risk behaviours than the control group, but there were no differences between trial arms for sexual risk behaviours (Garfein et al., 2007). Among those who were HCV positive, the intervention group reported a 26% greater reduction in distributive risk behaviours than the control group (Latka et al., 2008). The authors believe that the absence of gender-specific intervention content could have resulted in the lack of intervention effect on sexual risk behaviours for women participating in the DUIT trial (Mackesy-Amiti et al., 2014). They stress the need to address issues of gender norms, relationship power, sexual coercion, and negotiation of safer sex for reducing sexual risk behaviours among women who inject drugs. Furthermore, barriers that can impede females who inject from accessing harm reduction services and information, such as stigmatisation and fear of child removal (Harris et al., 2015) should be addressed to ensure women can access the treatment and support they require.

The need for gender sensitive interventions

Despite some injecting and sexual risk practices putting women who inject drugs at increased risk for acquiring or transmitting HCV, none of the six trials in the Sacks-Davis et al. (2012) review were targeted at women who inject drugs and just 24%-46% of the participants in the included trials were female. Gender sensitive

interventions should be developed and tested to address the specific risk behaviours for HCV transmission among women, including those related to co-occurring psychiatric symptoms and intimate relationships (Greenfield & Pirard, 2009). Moreover, women report a preference for female-only groups in drug treatment as they allow discussion of sensitive topics in a safe environment (Grosenick & Hatmaker, 2000). The risk of sexual acquisition of HCV for HIV negative women is extremely low. HCV prevention interventions for people who inject drugs may result in their rationalising sharing injecting equipment with a sexual partner they are having unprotected sex with, if they perceive an equivalent risk of HCV from both behaviours (Harris & Rhodes, 2013). Interventions for women should therefore, concentrate on reducing injecting risk behaviours, highlight situations in which sexual transmission is possible (e.g. rough and anal sex where blood-to-blood contact may occur, and among those women who are HIV positive) and provide skills/tools to help women negotiate safer sexual interactions in situations that may result in increased transmission risk, such as intimate partner violence and sex trading. While in some countries (e.g. 1% in the UK) HIV prevalence among people who inject drugs remains low (Hope et al., 2014), trend data from the European Union highlights that the rate of HIV among people who inject drugs from Spain, Italy and Poland remains unchanged (Weissing et al., 2011), with individual studies reporting prevalence rates ranging from 11% in Italy (Cruciani et al., 2013) to 30% among female injectors in Spain (Barrio et al., 2007). Moreover, in countries such as Poland, with elevated HIV prevalence among people who inject drugs (18%), co-infection with HCV is reported to be 17% (Rosinska et al., 2015). Therefore, the inclusion of information on safer sex and discussion on the increased risk of sexual transmission of HCV among women with HIV is warranted.

Aims of the study

This study aimed to 1) adapt the US DUIT intervention (Garfein et al., 2007) for women; 2) test the feasibility and acceptability of delivering the adapted intervention in drug treatment settings in Europe; and 3) determine the initial effectiveness of the adapted intervention to reduce HCV risk behaviours and increase HCV transmission knowledge among women who inject drugs in five European countries.

METHODS

Design

An uncontrolled, field effectiveness study of a manualised 3-session psychosocial group intervention, adapted from the DUIT intervention, with outcomes measured pre and one month post intervention was undertaken in 2013.

Adapting the intervention

Permission was granted by the authors of DUIT to adapt the intervention. The Capacity Opportunity Motivation-Behaviour framework was used to understand behaviour change (Michie et al., 2014) and inform the intervention adaptation. The DUIT intervention was reviewed by the research team and adapted where required to include up-to-date information on sexual risk of HCV transmission (Franciscus, 2015), pregnancy, motherhood and HCV transmission (Porter, 2013), and to include female relevant scenarios in the exercises and examples (Gilbert et al., 2006). The adapted intervention highlighted the link between depression and HCV risk behaviours and provided participants with skills to recognise and address such

feelings (Carpenter et al., 2006; Carpenter et al., 2008; Gilbert et al., 2006; Lewinsohn et al., 1984).

The intervention

The REDUCE intervention consisted of three two-hour manualised group sessions. Each session began with a welcome and subsequent sessions had a brief feedback on what was learned in the previous session before progressing to the goals of that session. In each session, participants learned about HCV transmission through discussion and activities. Each session included one didactic presentation from the group facilitator, and used games, role-play, exercises, information pamphlets, video and skills building approaches to enhance learning. There are many misunderstandings or myths surrounding HCV transmission. Session 1 “Understanding Hepatitis C transmission risks” included a myths and facts game to ensure participants had up-to-date information about HCV and its transmission (e.g. there is no vaccination to protect against HCV, reinfection with another genotype of HCV is possible etc.). Thereafter, participants watched and discussed a video that demonstrated how cross-contamination of injecting paraphernalia could occur and engaged in an activity that allowed them to rate the HCV transmission risk for specific injecting behaviours (e.g. injecting with someone else’s used needles (higher risk) to use a new syringe and equipment for every injection (lower risk)). Having highlighted the injecting HCV transmission risks, motivation and strategies to reduce risks were considered (e.g. labelling your syringe to avoid inadvertent sharing). In session 2 “Hepatitis C and sexual wellbeing – negotiating safety”, the low risk of sexual and mother-to-child transmission and the need to avoid pregnancy during HCV treatment were explained, using a rate the risk group activity. The next activity focused on why

some women do things that may put them at risk of HCV (relationships and power, withdrawal etc.) and identified strategies/solutions and built skills and motivation to negotiate safer interactions with intimate partners and others. In the final session, “Hepatitis C and emotional wellbeing – reducing negative mood”, participants learned to identify symptoms of depression, understand the association between HCV treatment and depression, and between risk taking behaviours and depression by using the Behavioural Model of Depression (i.e. mood can be changed by your activities and the situations in which you place yourself. We can lift our mood by doing pleasant activities). Participants considered what they could do to change the way they feel and facilitators taught safer-coping skills, including the use of positive self-talk, for participants to use when they were feeling depressed. The manual is available from the corresponding author or can be downloaded free of charge in English, Italian, German, Polish and Spanish from the REDUCE project website www.thereduceproject.imim.es (Figure 1).

INSERT FIGURE 1 HERE

Participants, setting and recruitment

Females aged 18 years and older and who had injected heroin or other opiates, cocaine or amphetamines in the previous month were eligible to participate.

Participants were recruited from harm reduction services (including a low threshold drop-in in Warsaw (Poland) where self-injecting is tolerated; injecting rooms in Barcelona (Spain)) and waiting rooms of drug treatment centres (health service and third sector providers that offered opiate substitution therapy, drug treatment and needle and syringe exchange) in Vienna (Austria), Ascoli Piceno

(Italy), Warsaw (Poland), Paisley (Scotland) and Barcelona (Spain). In addition, staff approached eligible participants and asked them whether they were interested in being contacted by a researcher to hear more about the study. The study was explained to potential participants verbally by researchers and all participants were given an information sheet about the study prior to the researcher gaining informed consent. With the exception of Warsaw, interviews were conducted by employees of Universities or Health Authorities. In Warsaw interviews were conducted by harm reduction workers, including two ex-service users. Participation was voluntary and participants were made aware that they could drop out of the study at any time without having to give a reason, and that this would not affect the care they received at the harm reduction or treatment centre.

Researchers reminded participants of the intervention times and dates by telephone and/or text on the day before and/or on the morning of the intervention session they were due to attend. Participants received gift vouchers as a thank you for their time and travel expenses following participation in each intervention session and research interview.

Measures

The following outcomes were assessed at baseline (pre-intervention) and one month post intervention: HCV transmission knowledge, injecting and drug risk behaviours, condom use, and depressive symptoms. Instruments were self-administered with assistance by a trained researcher where required in a private room in all sites except Scotland, where they were interviewer-administered.

The HCV transmission knowledge questionnaire used in this study (REDUCE, 2013) was adapted from Balfour et al. (Balfour et al., 2009) and updated to include

gender specific questions, and questions that incorporated recent advances in sexual and vertical transmission (Tohme & Holmberg, 2010). The questionnaire used in the current study had 53 risk statements with three response options “true”, “false” and “don’t know”. Each correct answer scored one. The total score ranged from 0-53. The higher the total score, the greater the HCV transmission knowledge.

Questions were included to determine the frequency of past month injecting drug use, injecting preparation and administration practices, and sexual practices to determine the frequency of these HCV transmission risk behaviours (University of the West of Scotland, 2012; Cox et al., 2008).

The Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001) is a reliable and valid measure of depression severity across nine depressive symptoms experienced in the past two weeks as "0" (not at all) to "3" (nearly every day). A PHQ-9 score of 10 or more had a sensitivity of 88% and a specificity of 88% for major depression (Kroenke et al., 2001). However, recent research suggests that a cut-off of 12 should be used for substance misusers (Delgadillo, 2012).

Intervention delivery

Following training in its use, the manualised intervention was delivered in outpatient drug treatment settings by a Clinical Psychologist in Austria, Italy and Spain, by two Health Educators in Poland, and by a blood borne virus Nurse in Scotland. The interventionists at each site reflected the usual way that interventions were delivered at these treatment settings, and therefore, real practice. A researcher attended each session to check the fidelity of the intervention delivered against the manual. One group programme of three sessions took place in each city (range 5-10 participants per group).

Analysis

Paired t-tests were used for continuous data and McNemar tests for matched pairs were used for categorical data to compare pre and post intervention findings.

Intention to treat analysis was conducted to ensure that all participants who began the treatment were included in the analysis, whether they completed all three sessions of the intervention or not. Therefore, if the participant did not complete the assessment one month post intervention, the responses from their baseline assessment were used to assume no change in their behaviour or knowledge. Such imputation of data was conducted for four cases at one month post intervention follow-up. One question asked participants of all the needles and syringes that they used to inject in the last month, how many were new and unused (i.e. from a packet) on a scale of 0 to 10 (where 0 was none and 10 was all). A score of 10 was entered for the four participants that had ceased injecting at one month post intervention to allow for intention to treat analysis to be conducted.

The intervention was targeted at women who had injected drugs in the past month regardless of their self-reported HCV status, as previous research confirms that people who inject drugs are not always aware of their HCV status, and that self-reported and actual HCV status often differ (Kwiatkowski et al., 2002; O'Keefe et al., 2013). The analysis is therefore, not presented by HCV status.

RESULTS

Thirty six females who injected opiates or stimulant drugs in the previous month completed the baseline assessment with the researcher prior to beginning the intervention: 10 from Austria, 6 from Italy, 5 from Poland, 7 from Scotland and 8 from Spain (Table 1). The mean age of the participants was 32.19 years (SD 8.31; range

22-56 years). Most participants lived with their intimate partner (16/36; 44.4%), 19.4% (7/36) lived alone, 19.4% (7/36) lived with friends or flatmates, 11.1% (4/36) lived with other family members and 8.3% (3/36) lived with their children (answers not mutually exclusive). The majority of participants had attained secondary school qualifications (20/36; 55.6%) or a technical certificate or apprentice (10/36; 27.8%). The majority were heterosexual (29/34; 85.3%). Almost 9% had exchanged sex for money, drugs or goods in the past month (3/34; 8.8%). Forty two percent (15/36; 41.7%) reported they had ever been afraid of an intimate partner, with three (3/14; 21.4%) participants stating they were afraid of their current intimate partner. At baseline the drugs that participants had injected most often in the previous month were heroin/other opiates (23/36; 63.9%); cocaine (9/36; 25.0%); amphetamine (3/36; 8.3%) and speedball (heroin and cocaine together) (1/36; 2.8%). Thirty two of the 36 participants reported they had ever been tested for HCV: nine self-reported they were HCV negative (28.1%), 18 self-reported they were HCV positive (56.3%) and five reported they did not know or were unwilling to disclose their HCV status (15.6%). Table 1 describes the attendance at each session and attrition by country.

INSERT TABLE 1 HERE

Mean HCV transmission knowledge scores increased significantly from baseline (pre-intervention) to one month post intervention (36.44 (SD 6.81) versus 44.97 (SD 5.74); $t(35) = -7.845$, $p < 0.001$). All participants had injected drugs in the month prior to baseline assessment, mainly heroin (17/36; 47.2%) or other opiates (6/36; 16.7%), cocaine (9/36; 25.0%) or amphetamine (3/36; 8.3%). One month post

intervention, four participants had not injected in the month prior since the intervention (4/36; 11.1%).

INSERT TABLE 2

Participants were asked of all the needles and syringes that they used to inject in the last month, how many were new and unused (i.e. from a packet) on a scale of 0 to 10 (where 0 was none and 10 was all). There was a significant increase reported in the number of all new and unused needles/syringes used to inject in the past month (Table 2). Among the total sample (where 10 was imputed for those who had not injected in the month post intervention), reductions were reported in the mean number of times participants had injected with a needle/syringe that had already been used by someone else, the mean number of different people that they had received used needles/syringes from and the mean number of different people that they had passed their used needles/syringes on to from baseline to one month post intervention, although these reductions were not statistically significant (Table 2). Compared to baseline, the proportion of participants who had at one month post intervention used spoons or containers for mixing that had previously been used by someone else, used an alcohol swab when they injected drugs after the injection and shared filters, spoons, cookers or water with someone they knew was HCV positive reduced significantly. There was a marginally significant reduction in the proportion of participants who reported preparing drugs or rinsing their works with water that had already been used by someone else at one month post intervention (Table 2). No reduction in condom use was reported. For participants who reported having intimate relations with men and having vaginal sex in the past month (21/30; 70.0%

at baseline and 19/32; 59.4% at one month post intervention), 47.6% (10/21) at baseline and 52.6% (10/19) at one month post intervention reported they had never used condoms for vaginal sex during that time period. Table 3 describes a trend towards greater ability to make decisions or negotiate safer drug preparation in the month post intervention among those who reported sharing a drug with another person before or after preparing it from baseline assessment.

INSERT TABLE 3

Depressive symptoms did not reduce significantly from baseline to one month post intervention (14.25 (SD 5.49) vs 14.53 (SD 6.79); $t(35) = -0.313$, $p = 0.756$).

Acceptability

Feedback from staff who delivered and participants who attended the intervention determined its acceptability, and identified areas that worked well and those that could be improved. While the intervention was relatively brief (three sessions), professionals believed that the duration of each session (two hours) was too long for participants to concentrate well throughout. However, they also believed that two hours was too brief to be able to answer all questions raised by participants. Participants stated that they learned a lot and really enjoyed the interactive parts of the intervention including the video, games and role play exercises. They found the didactic sessions delivered by the professionals to be less interesting. The first session, *Understanding Hepatitis C transmission risks*, was enjoyed the most, followed by the second session, *Hepatitis C and sexual wellbeing– negotiating safety*. Participants felt that the strategies taught during the third session, *Hepatitis C*

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2
3 *and emotional wellbeing – reducing negative mood*, were not enough to stop them
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5 injecting (and taking risks) when they were feeling down. This view is reflected in the
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7 findings that depressive symptoms did not reduce one month post-intervention.
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10 11 12 **DISCUSSION**

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14 The findings demonstrate that it was feasible and acceptable to deliver a three
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16 session gender specific group intervention to address HCV transmission risks in
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18 harm reduction and drug treatment centres in five European cities. One month post-
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20 intervention, women's knowledge on HCV transmission had significantly increased
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22 (with an average of nine additional correct answers). However, increased knowledge
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24 alone does not necessarily result in corresponding changes in behaviour, therefore it
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26 is important that the intervention also addresses capability, opportunity and
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28 motivation (Michie et al., 2014).
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32 While there were reductions in all drug administration and preparation risk
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34 behaviours, only the following risk behaviours reduced significantly from pre to one
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36 month post-intervention: the use of spoons or containers for mixing that had
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38 previously been used by someone else, sharing of filters, spoons, cookers or water
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40 with someone who was HCV positive and the use of an alcohol swab following
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42 injection. There was a significant increase in the proportion of new and unused
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44 needles and syringes used to inject drug with. Despite the intervention highlighting
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46 the possibility of becoming infected with another genotype of HCV and therefore the
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48 importance of not sharing injecting equipment with others regardless of their HCV
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50 status, the increase in the proportion sharing equipment with only those whose HIV
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52 or HCV status was the same as theirs was a concern and the message about this
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54 risk requires to be strengthened in future interventions. Conflicting results have been
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found regarding the impact of HCV status on injecting risk behaviours. Some studies report that those who knew they were HCV positive engaged in fewer HCV risk behaviours than those who were unaware of their status (Kwiatkowski et al., 2002), while other studies reported no difference (Norden, et al., 2009) or high needle sharing among people who were HCV positive (Korthuis et al., 2012). This may be due to the fact that people engage in risky injection behaviours with those they believe are also infected with HCV (i.e. “sero-sort”) (Burt, Thiede, & Hagan, 2009), potentially not understanding the risks of becoming infected with another genotype of the virus. While the results were not significant, greater proportions of women felt they were better able to control (e.g. refuse to inject because they believed the drugs were prepared unsafely, take the initiative of preparing the drugs, make sure drug preparation and injection was done safely) the preparation and administration of the injecting process (Table 3).

No increases in condom use were reported post-intervention, potentially due to 44% of participants living with an intimate partner, therefore other forms of contraception may be being used, or that as with many longer-term relationships contraception is not always used with steady partners (Mercer et al., 2013), once trust is established in the relationship (Gilchrist et al., 2011).

There were no changes in depressive symptoms from pre to one month post-intervention. The REDUCE intervention included strategies to improve mood, and did not attempt to treat depression, therefore, it was perhaps unrealistic to expect any change in depressive symptoms. More intensive treatment should be offered to women who inject drugs with comorbid depression, given the relationship between depressive symptoms and injecting and sexual risk behaviours (Gilchrist et al., 2011; Stein et al., 2005).

Limitations of the study

Findings from the intervention study are limited as it was not a randomised controlled trial. The small sample size could have resulted in type II errors, with insufficient power to account for the variation in treatment and sampling variations across sites. Participants were engaged with drug treatment or needle exchange services so the findings may not be generalizable to all women who inject drugs particularly those not engaged with treatment services, whose situations and experiences may be different. Eleven participants had also taken part in the mixed methods study so may have been familiar with the HCV transmission knowledge questionnaire, although participants in the mixed methods study were not given the correct answers to the questionnaire in that study. Most sites reported that the follow-up questionnaires were self-completed, however where participants required help due to literacy or concentration issues they were assisted by the researcher. Previous research found similar disclosure rates of sensitive or stigmatising information (including substance use) across face-to-face interview, telephone interview and paper-and-pencil questionnaires (Rosenbaum et al., 2006). While it is possible that participants may have under-reported specific behaviors to be viewed favorably by the researcher (i.e. social desirability), self-reports of drug use and risk behaviours have shown acceptable levels of reliability and validity (Darke, 1998). Despite these limitations, the intervention did successfully reduce some injection risk behaviours and significantly increased HCV transmission knowledge among women in this study. However, it was not successful in reducing depressive symptoms or sexual risk behaviours, potentially due to the fact that the intervention was not targeted at reducing depressive symptoms and the majority of participants may have been in

long term established relationships where condoms were not routinely used. As high proportions of women in this sample reported depressive symptoms, more intensive intervention should be offered to address depressive symptoms. Moreover, it may be unrealistic to encourage condom use in established relationships. Promising findings have been shown from interventions that have targeted couples who use drugs (El-Bassel et al., 2014). “Symbiotic” goals for people who inject drugs, such as avoiding injecting related scars or marks and maintaining venous access, may result in the use of sterile injecting equipment (Harris & Rhodes, 2012). Future harm reduction interventions, should focus on these symbiotic goals, and include protective practices and strategies to avoid injecting risk situations such as withdrawal and lack of preparedness (Harris et al., 2012; Mateu-Gelabert et al., 2014; Treolar et al., 2015).

CONCLUSIONS

The REDUCE intervention is an innovative, evidence-informed gender-specific group intervention to reduce HCV risk behaviours in the particularly vulnerable target group of women who inject drugs. The study found that the intervention was both feasible to introduce in real world harm reduction and drug treatment services throughout Europe and promising findings on reducing injecting risk behaviours were reported at one month post-intervention. There remains a need to update the intervention to incorporate recent findings on HCV prevention and determine whether these results can be improved. The benefits of successful early intervention to reduce risk behaviours and subsequently HCV transmission, in comparison to the consecutive costs of treatment (from interferon to liver transplantation) highlight the importance of psychosocial interventions as part of a wider harm reduction strategy to reduce HCV among women who inject drugs.

Declaration of interest

All the authors declare that there is no potential conflict of interest.

For Peer Review Only

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Figure 1. REDUCE group intervention session content

Session	Goals	Content ((38) unless otherwise cited)
1 Understanding Hepatitis C transmission risks	<ol style="list-style-type: none"> 1. Introduce the REDUCE project and intervention. 2. Build group cohesion. 3. Establish group rules. 4. Engage participants. 5. Increase knowledge about Hepatitis C and transmission injecting risk behaviours. 6. Motivate participants to change their risk behaviours. 	<ol style="list-style-type: none"> 1.1 Introduction and welcome 1.2 Group rules 1.3 Myths and facts (game) about Hepatitis C 1.4 Injecting risks: cross contamination (video) 1.5 Transmission risks pyramid (exercise) 1.6 Strategies for reducing injection risk 1.7 Deciding whether or not to change your behaviour 1.8 Distribution of leaflet on Hepatitis C transmission risks and local resources 1.9 Close
2 Hepatitis C and sexual wellbeing – negotiating safety	<ol style="list-style-type: none"> 1. Increase knowledge about hepatitis C transmission and sexual well-being. 2. Identify barriers to reducing sexual and injecting risk behaviours. 3. Identify strategies for reducing hepatitis C risk with intimate partners and others. 4. Increase knowledge about hepatitis C transmission during pregnancy and from mother to child. 5. Motivate participants to change their risk behaviours. 	<ol style="list-style-type: none"> 2.1 Welcome and feedback on Session 1 2.2 Sexual transmission of Hepatitis C (40) 2.3 Pregnancy, motherhood and Hepatitis C (41) 2.4 Rate the risk activity 2.5 Why do women do risky things that can put them at risk of Hepatitis C? 2.6 Skills building: using TALK to negotiate safer sex and injection behaviours 2.7 Review and close
3 Hepatitis C and emotional wellbeing – reducing negative mood	<ol style="list-style-type: none"> 1. Increase knowledge about the association between Hepatitis C treatment and depression. 2. Increase knowledge about the potential relationship between risk behaviours and negative mood. 3. Identify symptoms of negative mood. 4. Introduce the behavioural model of depression. 5. Identify strategies for managing negative mood. 6. Develop an understanding of self-talk and how to use it. 7. Motivate participants to change their risk behaviours. 	<ol style="list-style-type: none"> 3.1 Welcome and feedback on Session 2 3.2 What is depression? (42) 3.3 Understanding the link between depression and Hepatitis C (43) 3.4 What can we do to change the way we feel? (44-46) 3.5 The depression model (44-46) 3.6 Skills Building: Using Safe-Coping and Self-Talk (42) 3.7 Review and close

Table 1. Compliance and attrition by country

	Number attending each intervention session			Number completing assessments at each time frame	
	1	2	3	Baseline (pre- intervention)	One month post intervention
Austria	10	10	10	10	8
Italy	5*	5	5	6	6
Poland	5	4**	3**	5	5
Scotland	7	6	4	7	6
Spain	8	4	6	8	7
Total	35	29	28	36	32

* one participant did not attend session 1 but attended session 2 (where the key learnings from session 1 were reviewed) and session 3

** Sessions delivered individually to participants absent in sessions 2 and 3.

Table 2. Injecting risk behaviours

In the last month....	Baseline (pre- intervention) N=36 Mean (SD)	One month post intervention N=36 Mean (SD)	t	(df)	P
Of all needles and syringes used to inject in the last month, how many were new and unused (i.e. from a packet) on a scale of 0 to 10 (where 0 was none and 10 was all)	8.44 (2.91)	9.50 (1.08)	-2.14	(35)	0.040
Times injected with a needle/ syringe that had already been used by someone else	0.69 (1.95)	0.36 (1.69)	1.080	(35)	0.287
Number different people received used needles/syringes from	0.33 (0.63)	0.19 (0.86)	1.405	(35)	0.169
Number different people passed used needles/syringes on to	0.28 (0.51)	0.22 (0.48)	0.627	(35)	0.535
In the last month....	Baseline (pre-intervention) N=36 N (%)	One month post intervention N=36 N (%)			P
Shared needles/syringes with someone you knew had HCV	5 (13.9)	3 (8.5)			0.625
Used spoons or containers for mixing that had previously been used by someone else	18 (50.0)	8 (22.2)			0.031
Used filters that had previously been used by someone else	10 (27.8)	5 (13.9)			0.227
Prepared drugs or rinsed your works with water that had already been used by someone else	9 (25.0)	4 (11.1)			0.063

Used an alcohol swab when you injected drugs before the injection	23 (63.9)	18 (50.0)	0.227
Used an alcohol swab when you injected drugs after the injection	23 (63.9)	13 (36.1)	0.006
Shared filters, spoons, cookers or water with someone you knew was HCV positive	10 (27.8)	4 (11.1)	0.031
Shared a drug with another person before preparing it (i.e. divide up the drug in powder form)	20 (55.6)	19 (52.8)	1.000
Shared a drug with another person after preparing it (i.e. after adding water to make it into a solution)	23 (63.9)	18 (50.0)	0.125

Table 3. Drug preparation behaviours

In the last month when you shared a drug with another person before or after preparing it were you able at least some of the time to....	Baseline (pre- intervention) N=28*	One month post intervention N=27*	p
Take the initiative of preparing the drugs	18 (64.3%)	21 (77.8%)	0.250
Refuse to inject because you believed the drugs were prepared unsafely	15 (53.6%)	19 (70.4%)	0.344
Make sure drug preparation and injection was done safely	24 (85.7%)	25 (92.6%)	1.000
Use drugs without feeling obliged to share equipment	22 (78.6%)	23 (85.2%)	1.000
Tell your injecting partner how to prepare it and inject safely	21 (75.0%)	24 (88.9%)	0.289
Declare your hepatitis C status	21 (75.0%)	22 (81.5%)	0.727
Share equipment with only those whose HIV or HCV status is the same as yours	12 (42.9%)	17 (63.0%)	0.109

*Analyses only conducted for those participants who reported that they had shared a drug with another person before or after preparing it in the last month